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Soil compaction is a problem in many South Dakota fields during dry years. The most severely affected areas are low places in fields which normally stay wet longer.

The compaction did not occur in the dry year but during the previous wetter years. During these years, field work was done when most of the field was dry enough, but the lower areas were still too wet, resulting in soil compaction.

Compaction causes yield reductions by restricting root growth. This is not as critical during wetter years because water runoff moved into these lower areas supplying extra moisture and plants simply didn't need as many roots. But in dry years, when rainfall is light and there is no runoff water, the crops in these low areas suffer severe drought stress due to limited root systems. In some cases, there is adequate moisture within one foot of the surface but roots can't reach it because of a compacted layer directly below the tillage zone. If not restricted by compaction, dry soil layers, salt levels or other impenetrable soil layers, most crops grown in South Dakota will root from 3 1/2 to 5 1/2 feet deep (Table 1).

Evaluating soils for compaction requires digging plants and observing the root system. Indications of a compaction problem are crooked roots, especially a lot of small sharp bends, roots that only follow cracks or appear to be in layers in soils, and the lack of roots below the tillage zone. Digging needs to get below the tillage zone. A bucket of water to wash soil from roots will be very helpful to prevent tearing roots off the plants. Root systems from suspected compacted areas should be compared to areas in the field where crops appear to be normal.

If compaction is a problem, deeper tillage will be necessary to break it. Tillage should penetrate below the compacted zone. The compaction frequently is only a few inches thick and lies right below the normal tillage zone. Tillage to destroy deep compaction must be done when soils are dry. When dry, soils will shatter. If wet, deep tillage instruments simply cut a groove in soil and literally do no good at all. Because soils must be dry, after harvest in late summer or fall is the only time deep tillage should be done.

Table 1. Rooting Depth of Crops in South Dakota

Crop	Depth feet
Spring small grains	3 1/2
Winter wheat	4 1/2
Corn	5 1/2
Soybeans	4

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